MATH 2415 Syllabus
Brookhaven College

Instructor Information
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Division Office and Phone: Science, Mathematics, and Engineering.
Room K224. 972-860-4750

Course Information
Course Title: Calculus III
Course Number: MATH 2415
Section Number: 23001
Semester/Year: Spring 2020
Credit Hours: 4
Class Meeting Time/Location: MW 8:30a in M115A
Certification Date: February 3, 2020
Last Day to Withdraw: April 16, 2020

Course Prerequisites
Required: MATH 2414 or equivalent.

Course Description
This course is a study of advanced topics in calculus including vectors and vector-valued functions, partial differentiation, Lagrange multipliers, multiple integrals, and Jacobians; application of the line integral including Green's Theorem, the Divergence Theorem, and Stokes' Theorem. (4 Lec)
Coordinating Board Academic Approval Number 2701016119
Student Learning Outcomes
Upon successful completion of this course, students will:

1. Perform calculus operations on vector-valued functions, including derivatives, integrals, curvature, displacement, velocity, acceleration, and torsion.
2. Perform calculus operations on functions of several variables, including partial derivatives, directional derivatives, and multiple integrals.
3. Find extrema and tangent planes.
4. Solve problems using the Fundamental Theorem of Line Integrals, Green's Theorem, the Divergence Theorem, and Stokes' Theorem.
5. Apply the computational and conceptual principles of calculus to the solutions of real-world problems.

Course Objectives
1. Perform operations on plane and space vectors including dot products and cross products.
2. Find the equation of lines/planes in space and identify/sketch surfaces.
4. Find the velocity and acceleration vector functions for a given position function and use them to solve projectile motion problems.
5. Find the unit tangent, unit normal, tangential/normal components of acceleration, arc length and curvature for given vector-valued space curve.
6. Find limits, partial derivatives, gradient, and directional derivatives for given functions of two variables.
7. Find the equation of tangent planes and normal lines to a given surface.
8. Determine relative extrema of given surfaces f (x, y) and maximize/minimize functions subject to given constraint using Lagrangian Multipliers.
9. Evaluate double integrals and use them to find areas of plane regions, volumes of solids, center of mass and moments of plane regions, and surface areas.
10. Evaluate triple integrals and use them to find volumes, mass, center of mass and moments in rectangular, cylindrical and spherical coordinate systems.
11. Given a vector field, find the curl, divergence, determine whether it is conservative, and find the potential function for conservative fields.
12. Evaluate line integrals over specified paths using either parameterization or the Fundamental Theorem of Line Integrals depending on whether the integral is independent of path.
13. Evaluate surface integrals over a specified plane region and use them to find flux.
14. Use the Divergence Theorem to evaluate surface integrals, Green’s Theorem to evaluate line integrals around closed plane curves, and Stoke’s Theorem to evaluate line integrals around closed curves on a surface

Texas Core Objectives
The College defines essential knowledge and skills that students need to develop during their college experience. These general education competencies parallel the Texas Core Objectives for Student Learning. In this course, the activities you engage in will give you the opportunity to practice two or more of the following core competencies:

1. **Critical Thinking Skills** - to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

2. **Communication Skills** - to include effective development, interpretation, and expression of ideas through written, oral, and visual communication

3. **Empirical and Quantitative Skills** - to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

4. **Teamwork** - to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

5. **Personal Responsibility** - to include the ability to connect choices, actions, and consequences to ethical decision-making

6. **Social Responsibility** - to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities

Required Course Materials
ISBN: 1133112280

TI-Graphing Calculator Required. TI-84 Plus Calculator Recommended. (no TI-NSpire, No TI-89, No TI-92) No Casio calculators may be utilized on tests.

Note: A student of this institution is not under any obligation to purchase a textbook from a university-affiliated bookstore. The same textbook may also be available from an independent retailer, including an online retailer.
Graded Work
The tables below provide a summary of the graded work in this course and an explanation of how your final course grade will be calculated.

Summary of Graded Work

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>20%</td>
</tr>
<tr>
<td>4 Exams</td>
<td>80%</td>
</tr>
</tbody>
</table>

TOTAL: 100%

For students that miss no more than one class this semester, I will drop your lowest quiz grade. Note: coming in late and leaving early count as partial absences (3 partial absences = 1 full absence).

Final Grade

<table>
<thead>
<tr>
<th>Percentages</th>
<th>Letter Grade</th>
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</thead>
<tbody>
<tr>
<td>90-100%</td>
<td>A</td>
</tr>
<tr>
<td>80-89%</td>
<td>B</td>
</tr>
<tr>
<td>70-79%</td>
<td>C</td>
</tr>
<tr>
<td>60-69%</td>
<td>D</td>
</tr>
<tr>
<td>0-59%</td>
<td>F</td>
</tr>
</tbody>
</table>

Grade Reports
Final grade reports are not mailed to students. You may obtain your final grades online at https://econnect.dcccd.edu/. From the student menu, select “My Grades” under “My Personal Information.” If you are not already logged in, you will be prompted to do so. Select the grade type you wish to review. Press the submit button and all grades for the selected grade type will be displayed.

Late Work Policy
In general, late work will not be accepted. If a student has a documented reason for missing a test deadline and communicates with the professor prior to the test deadline, the professor will work with the student to determine a possible extension on a maximum of one test. A student who fails to communicate with the instructor prior to
the test deadline will not receive any extensions. An extension is granted at the discretion of the instructor with approved documentation from the student.

Other Course Policies

Incomplete grades are given when an unforeseen emergency prevents a student from completing the work in a course after the Drop date. To be considered for an incomplete grade, the student must be passing at the time of the Drop date. The division Dean must approve all “I” grades.

Classroom Expectations

The theme of this class is respect. I will treat you with respect and I expect the same treatment from you. In addition, I ask that you also be respectful to classmates. This means that you are not to interrupt your classmates or interrupt me when I am talking. Disparaging comments about classmates or about me will not be tolerated. Furthermore, cell phones ringing during class, text messaging during class, and arriving late to class are examples of rude and disrespectful behaviors. You are to arrive on time to class and turn off cell phones or put them on vibrate when entering the classroom. If you receive an emergency call, please step outside of the classroom to take the call. Text messaging is not allowed during class time.

- Engaging with your smart phone is not allowed during class time as it is a disruption to you and the instructor. You will be asked to leave class for the day if seen doing so.
- If you are going to come to class you are expected to be in your seat at 8:30am. Excessive tardiness will not be tolerated as it is a disruption to the instructor and other students who show up on time. Students with excessive tardiness will be asked to remain in the hall until the one hour break, or drop the course.

Because disrespectful behaviors can sometimes become an issue, I’ve developed a policy that I will follow. Students who continue to display rude and disrespectful behaviors will be given a warning. If the behavior continues, students will be asked to leave the class. The student must meet with me before he/she can return to class.

*We, the Math Department of BHC, take issues of dishonesty very seriously. If a student is caught violating any policy of the Testing Center, or an instructor’s own policy for their particular class, the following consequences will be enforced: The minimum penalty a student will receive is a zero for the assignment/exam and the maximum penalty will be to receive an F for the course and/or academic suspension.*
Institutional Policies

Institutional Policies relating to this course can be accessed using the link below. These policies include information about tutoring, Disabilities Services, class drop and repeat options, Title IX, and more.

[Brookhaven Institutional Policies](http://www.brookhavencollege.edu/syllabipolicies)

### Tentative Course Schedule (subject to change)

<table>
<thead>
<tr>
<th>DAY</th>
<th>SECTIONS &amp; TOPICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10.1 - Three-Dimensional Coordinate Systems &lt;br&gt;10.2 – Vectors</td>
</tr>
<tr>
<td>2</td>
<td>10.3 - The Dot Product &lt;br&gt;10.4 - The Cross Product</td>
</tr>
<tr>
<td>3</td>
<td>10.5 - Equations of Lines and Planes</td>
</tr>
<tr>
<td>4</td>
<td>10.6 - Cylinders and Quadric Surfaces</td>
</tr>
<tr>
<td>5</td>
<td>10.7 - Vector Functions and Space Curves</td>
</tr>
<tr>
<td>6</td>
<td>10.8 - Arc Length and Curvature</td>
</tr>
<tr>
<td>7</td>
<td>10.9 - Motion in Space: Velocity and Acceleration &lt;br&gt;Review</td>
</tr>
<tr>
<td>8</td>
<td><strong>Test 1 (Chapter 10) in Class</strong></td>
</tr>
<tr>
<td>9</td>
<td>11.1 - Functions of Several Variables &lt;br&gt;11.2 - Limits and Continuity</td>
</tr>
<tr>
<td>10</td>
<td>11.3 - Partial Derivatives &lt;br&gt;11.4 - Tangent Planes and Linear Approximations</td>
</tr>
<tr>
<td>11</td>
<td>11.4 - Tangent Planes and Linear Approximations &lt;br&gt;11.5 - The Chain Rule</td>
</tr>
<tr>
<td>12</td>
<td>11.6 - Directional Derivatives and the Gradient Vector</td>
</tr>
<tr>
<td>13</td>
<td>11.7 - Maximum and minimum values</td>
</tr>
<tr>
<td>14</td>
<td>11.8 - Lagrange Multipliers &lt;br&gt;Review</td>
</tr>
<tr>
<td>15</td>
<td><strong>Test 2 (Chapter 11) in Class</strong></td>
</tr>
<tr>
<td>16</td>
<td>12.1 - Double Integrals Over Rectangles &lt;br&gt;12.2 - Double Integrals Over General Regions</td>
</tr>
</tbody>
</table>
| 17 | 12.2 - Double Integrals Over General Regions  
|    | 12.3 - Double Integrals in Polar Coordinates  
| 18 | 12.3 - Double Integrals in Polar Coordinates  
|    | 12.4 - Applications of Double Integrals  
| 19 | 12.5 - Triple Integrals  
| 20 | 12.6 - Triple Integrals in Cylindrical Coordinates  
|    | 12.7 - Triple Integrals in Spherical Coordinates  
| 21 | 12.8 - Change of Variables in Multiple Integrals  
|    | Review  
| 22 | **Test 3 (Chapter 12) in Class**  
| 23 | 13.1 - Vector Fields  
|    | 13.2 - Line Integrals  
| 24 | 13.2 - Line Integrals  
|    | 13.3 - The Fundamental Theorem for Line Integrals  
| 25 | 13.3 - The Fundamental Theorem for Line Integrals  
|    | 13.4 - Green's Theorem  
| 26 | 13.5 - Curl and Divergence  
|    | 13.6 - Parametric Surfaces and Their Areas  
| 27 | 13.6 - Parametric Surfaces and Their Areas  
|    | 13.7 - Surface Integrals  
| 28 | 13.7 - Surface Integrals  
|    | 13.8 - Stokes' Theorem  
| 29 | 13.9 - The Divergence Theorem  
|    | Review  
| 30 | **Test 4 (Chapter 13) in Class**
